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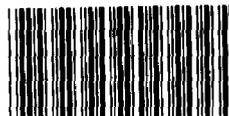
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The Honorable Lloyd Bentsen
Chairman, Joint Economic Committee
United States Senate



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7-27-70

Dear Mr. Chairman:

Subject: The Feasibility of Automating the Search Process at the Patent and Trademark Office (FGMSD-80-40)

We reviewed the feasibility of automating the search process at the Patent and Trademark Office as you requested on April 9, 1979. You asked us to briefly examine the Office's prior art patent search process to determine whether automation of this process would reduce costs and improve quality. In the search process the concept in a patent application is compared with concepts in previously issued patents and nonpatent literature. We did not review the overall effectiveness of the patent system.

We do not believe that the prior art search process should be automated at this time for several reasons. First, if the search process were automated it would save little patent processing time. The manual search process takes only about 4 hours of the average 15 hours spent examining a patent and is a very small part of the average 21 months it takes to process a patent. Secondly, the manual search process relies on knowledge of the subject, judgment, and review of drawings and descriptive technical data, and would be a highly complex process to automate. Finally, the cost of automation could not be justified at this time on the basis of reduced examiner search time alone. Future technology as well as the additional benefits to the public in terms of enhanced patent quality and improved dissemination of patent information may shift that balance. Continued efforts toward eventual automation appear justified.

Although automation of the search process at this time would not significantly improve the patent examining process, there is a more serious problem that should be addressed--the lack of integrity in the examiners' files. These and other matters are discussed in this report.

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THE PATENT PROCESS

The Patent and Trademark Office, an agency of the Department of Commerce, is concerned primarily with encouraging and assisting the development of business and industry in the United States. Its role is to provide patent protection for inventions and trademark registration to serve the interests of inventors and businesses. It also assists other agencies in matters involving patents, inventions, and the transfer of technology. Finally, it encourages innovation and the scientific and technical advancement of the Nation by preserving, classifying, and disseminating patent information.

To carry out its duties, the Office examines applications and grants patents on inventions. It publishes and disseminates patent information, records patent assignments, maintains search files of U.S. and foreign patents and a search room for public use in examining issued patents and records, and supplies copies of patents and official records to the public. It performs similar functions in relation to trademarks.

The Patent and Trademark Office employs about 3,000 persons and received fiscal 1979 funding of about \$100 million. Patent examining operations alone were allocated about \$60 million. The Office received over 100,000 patent applications in fiscal 1979 and issued 52,000 patents. To date, the Office has issued over 4 million U.S. patents.

The patent process involves the following steps.

Preexamination (7 months)

1. The patent application is submitted by the inventor to the Commissioner of Patents. Applications are reviewed in the order they are received.
2. The application is mounted in a folder which will hold all documentation related to the patent.
3. The application is assigned to the appropriate examining group.
4. The application is assigned to an examiner with expertise relevant to the subject area of the application.

Examination (8 months)

5. An examiner reviews the application for sufficiency of description, compares it with relevant earlier

applications, and assesses the patentability of the applicant's claims. This process may require several interactions between the examiner and the applicant.

6. The patent application is allowed or rejected. The applicant may appeal rejected claims.

Printing (6 months)

7. Applicants submit the required issuance fee.
8. The patent is printed.

THE EXAMINATION PROCESS

The merits of a patent application are decided during the examination. The examiner's first step is to understand the concept of the claimed invention. This can be difficult because, while the inventor is obliged to reveal the inventive concepts in the application, the claims are usually stated in terms which permit the widest possible interpretation. (This is to give the patent, if issued, the widest possible coverage.) Once the examiner understands the concept, he or she must depict it in terms that permit access to the relevant collection of "prior art."

Prior art consists of U.S. patents, foreign patents, technical journals, and publications which total some 23.5 million documents and are divided into about 350 classes and 104,000 subclasses. The examiner scans the application to see which subclasses might be searched for relevant references. Using these references, the examiner tries to match the concept of the application with the concepts in the prior art and reaches a preliminary decision on the patentability of the proposed invention.

If the examiner finds that the invention as defined by the claims is not new, the claims are refused. The claims may also be refused if the difference between the new proposal and prior art is not significant or if the disclosure is insufficient. Claims are often rejected on the first action by the examiner; relatively few applications are allowed as initially filed. Usually, the applicant (or his agent) and the examiner interact and decide to limit the scope of the claim or somehow modify it. The examiner then decides whether to issue or deny the patent.

Patent applications are examined by highly trained individuals who are often specialists in particular fields.

The examining process calls for knowledgeable, reasoned judgment and is by no means a clerical function.

PRINCIPAL CONCERNS OF THE PATENT PROCESS

The two principal concerns in the examination of an application are (1) pendency--the total processing time of an application from filing to final disposition--and (2) the quality and reliability of the patent granted.

Pendency time has been reduced

Patent pendency is the period of time from the filing of an application to the date the patent is issued or the application abandoned. Pendency was a serious concern to the Patent Office and the Congress in the 1960s because it then took over 36 months to grant a patent. By adding more examiners to the staff and streamlining procedures, the Patent Office has moved much closer to its longstanding pendency goal of 18 months. Average pendency is now about 21 months. The Office considers 18 months to be a practical and reasonable length of time but plans to review the impact of various pendency times on the effectiveness of the patent system.

The length of the pendency period is important not only for efficiency but also because the patent application is a confidential document until the patent is issued. Therefore, one important benefit to society from the patent system--the public disclosure of technological advances--is delayed until the patent is granted.

Much of the pendency time today is due to a backlog of patent applications. The time between receipt of an application and beginning of examination has been averaging 7 months, or about 33 percent of pendency. Another 3 months, or 14 percent of pendency, is spent awaiting receipt of applicants' issuance fees after a patent has been approved.

Patent quality is questioned

According to a recent Patent and Trademark Office/Department of Commerce study, the patent system's constituencies perceive the quality of issued patents to be low and getting lower. The Patent and Trademark Office has taken only limited corrective action. Patent officials attribute their limited response primarily to funding limitations, but also point out that patent quality is subjective and that quantitative measures do not exist. Not only are Patent officials unsure of the current quality of the patent process, they concede

that, lacking measures, they do not know what the quality level should be. According to the same study, the true measure of patent quality is in the minds of users and potential users of the patent system. Despite this, however, no user survey has been conducted to determine and track perceived quality.

One possible measure of quality frequently mentioned is the high number of patents overturned by the courts. This seems to be a poor measure of patent quality, however, since less than one percent of all patents are ever litigated. An unknown number of patent challenges are settled out of court while another unknown number are subjected to intensive validity studies by patent attorneys who then decide not to contest the patent. Only those patents that seem challengeable go to the courts and of these, about half are invalidated. Patent challengers are often willing to spend substantial amounts of time and money and use top patent attorneys. The Patent Office cannot afford to match these resources.

Court findings in patent cases are important in that approximately 75 percent of the patents challenged due to prior art issues were overturned because of the presentation in court of prior art that was either not properly filed, missing from the files at the time of the search, or overlooked by the examiner.

Examiners' files lack integrity

A common, specific criticism of the Patent Office is that the quality of the search process needs improvement. Numerous Patent Office officials told us that their biggest quality problem is the lack of what they termed "file integrity." Many of the documents that are supposed to be in the examiners' files are not there.

Recognizing this problem, the Patent Office initiated a file integrity program in fiscal 1978. An inventory is taken comparing filed documents to a master computer file of all issued U.S. patents. The master list used for the inventory was initially created in the 1940s, and has been updated regularly. However, according to Patent Office officials, there is no way of knowing how many documents were missing when the master file was initially prepared or how well the file has been maintained over the years.

Foreign patents and nonpatent literature, which are equally important as U.S. patents in the search process, are not included in the file integrity reviews because the Office does not have a master list for these documents and so does not know what should be in the examiners' files. An inventory

system for foreign patents was initiated in 1978 but includes only foreign patents issued since that date.

The integrity of the examiners' search files is crucial to the issuance of valid patents. Yet, use of the file integrity program has shown that from 2 to 28 percent of the U.S. patents that should be in a given file subclass are not there. This percentage range of missing patents is especially troublesome since the upper limit tends to represent active subclasses such as solar energy. Accurate figures on the quality of foreign patents and nonpatent literature in the files (representing about 45 percent of filed documents in the examiners' search file) are not available.

While Patent Office officials admit there is a file integrity problem, they do not know its full extent or effect.

Causes of the file integrity problem

The file integrity problem is attributed to three main factors:

- Examiners remove patent documents from the files for further review but leave no indication in the files that documents have been removed.
- Clerical employees misplace patent documents in the course of refiling documents removed by examiners.
- Public access to the examiners' files results in misplaced or stolen documents.

In the course of a patent search, examiners remove documents from the files for more detailed review and usually keep them for about 3 days before returning them for refile. Refiling takes 1 to 3 days more. Other examiners who review the file while these documents are out have no way of knowing that documents are missing. Thus, examiners can miss prior art that could invalidate a patent application. The seriousness of this problem is unknown.

The integrity of the search file is highly dependent upon the accuracy and efficiency of the examiners' clerical support staff. This staff is responsible for

- placing new patent documents in the files,
- refiling documents that were removed from the files by examiners,

- rearranging the files to accommodate expansion, and
- completing other file maintenance.

The clerical staff must be prompt and accurate. The longer a document is out of the file, the greater the chance that another examiner will need it. Misfiled patent documents are likely to remain misfiled indefinitely since they can be identified only through the file integrity program. In its 2 years of operation, the program has reviewed only about 6 percent of all patent subclasses, so many of the patents identified as missing may actually be misfiled.

The public is given access to the examiners' search files because the public search file contains only U.S. patents in their classified form and not the increasingly important foreign patents and nonpatent literature. All patent information is available in its classified form in the examiners' files. While public access to the examiners' files is supposed to be strictly limited, over 65,000 public visits are known to have been made to these files in fiscal 1979. Public searchers are expected to sign in, but their use of the examiners' files is not monitored. Patent Office officials concede that documents could be removed without detection and believe that allowing public access to the examiners' files results in misplaced and stolen documents. The magnitude of this problem is also unknown.

AUTOMATING THE SEARCH PROCESS
WILL NOT IMPROVE TIMELINESS OR
QUALITY OR REDUCE COSTS

In the course of the average 21-month pendency, the time actually spent searching prior art is almost negligible. The total average examining time spent by each examiner per patent application is 15 hours, of which only about 4 hours is spent in the actual search. The remaining time is spent reviewing the prior art, reviewing the overall application, interacting with the applicant, and writing up office decisions.

The manual search process used by examiners is highly complex, relying on knowledge of the subject, judgment, and reviewing diagrams and descriptive technical data. Thus automation would be very difficult. While automated key-word systems exist that can help an examiner define the scope of a search, most examiners are sufficiently specialized to find such a system unnecessary.

The Patent Office is conducting some search process automation projects, but none has proven suitable for full

implementation. Patent officials are not sure how much of the search process can be automated. Furthermore, as one official told us, the Patent Office must gain control of the quality of its search files before automating them.

We agree with Patent Office officials that the cost of automation, if it could be done at this time and with current technology, could not be justified solely by savings in examiner search time. Future technology as well as the additional benefits to the public in terms of enhanced patent quality and improved dissemination of patent information may shift that balance. Continued efforts toward eventual automation appear justified.

Since the most serious quality problem at the Patent Office is believed to be the lack of file integrity caused by missing and misplaced patent documents in the examiners' files, these problems should be eliminated.

Some system should be developed that will let examiners and clerical support staff know what patent documents are removed from the files. Such a system would prevent examiners from overlooking relevant prior art that happens to be out of the file and improve the accuracy of refiling. The integrity of the files would thus be easier to monitor.

A possible system would be to require examiners to insert a card in the file when they remove patent documents. The card would have the document number and examiner's name on it, which would let other examiners and the clerical staff working in the area know what materials are missing and where they are. Patent Office officials expressed concern about the additional time such a system would require. We believe, however, that time should be a secondary consideration.

An alternative system would be to require examiners to identify documents they remove from the file. An automated system could be used to record and display all documents that have been removed from a given subclass and state their current location.

A system should also be developed to eliminate the problem of public users misplacing and removing patent documents from the examiners' search files. Examiners' files are open to the public only because the public files are not comparable to the examiners'. Were the files made comparable, the public would have no need for access to the examiners' search files. Alternatively, the security of the examiners' search files could be improved to prevent misfiling or permanent removal of patent documents. The first alternative would require a costly expansion of the public search room while the second

could impede examiners' access to their own files. Whichever system is selected--one of these or any other--it must ensure the integrity of the examiners' search files since patent quality is dependent on that integrity.

CONCLUSIONS

Timeliness and quality are important issues in the Patent Office. Both can be improved by making procedural changes. Automation of the search process at this time would not significantly improve timeliness or quality; it would merely make the process more costly. Whether or not the search process can ever be automated depends on future technology. The Patent Office should continue its ongoing experiments with techniques for automating the search process, and should be attuned to state-of-the-art advances in document search and retrieval systems.

Whether the pendency goal of 18 months is realistic and the current average pending time of 21 months is acceptable is beyond the scope of this report. If, however, pendency time is to be reduced, the two basic options are to

- request additional staff to reduce the backlog of applications awaiting review and/or
- limit the amount of time allowed an applicant to submit the issuance fee after approval.

We are concerned about patent quality. We believe the lack of integrity in the examiners' files is detrimental to the quality of patents issued and contributes to the perception that the patent process does not result in quality patents which can withstand challenge.

RECOMMENDATIONS

To improve patent quality, we recommend that the Secretary of Commerce direct the Commissioner of Patents and Trademarks to develop a system that will let examiners and clerical support staff know what patent documents are removed from the examiners' files. We also recommend that a system be developed that will protect the examiners' search files from nonexaminer abuse. This could be accomplished either by making the public search files comparable to the examiners' search files and then denying the public access to the examiners' files, or by improving the security and controlling access to the examiners' files so that public users could not misfile or permanently remove patent documents.

The Patent and Trademark Office should also be directed to determine the perceived quality of U.S. patents and better identify problems by regularly conducting user surveys.

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As requested by your office, we did not obtain written comments on this report from the Patent and Trademark Office. We did obtain oral comments which we have incorporated. These comments pointed out that (1) the Patent and Trademark Office has taken some actions to improve patent quality and would have taken more if funding had permitted and (2) automation costs should be balanced against improved quality and public access to the files, as well as savings in examiner search time.

As agreed with your office, unless you publicly announce the contents of this report earlier, we will not distribute it until 30 days from its date. We will then issue it to interested parties and give copies to others upon request.

Sincerely yours,



Comptroller General
of the United States